

REMARKS

The Office Action may be characterized as follows:

1. Claims 1 through 18 were present in the Application, and Claims 1 through 4, 11, 12, and 14 through 18 were withdrawn from consideration pending the allowance of a generic claim.
2. Claims 5 through 10 and 13 were rejected under 35 USC §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as invention.
3. Claims 5 through 10 and 13 were rejected under 35 USC §103(a) as being unpatentable over Switlik '059 in view of Wheeler '837.
4. In connection with the above, the Examiner pointed out certain areas of the rejected claims which required amendment. Moreover, the Examiner designated certain areas of the specification which he found required correction. Those and other corrections have been made in order to improve the form of the specification. And, the claims have been rewritten in order to comply with, and overcome, the Examiner's objections.

The above-noted bases for the rejection and/or objections are respectfully traversed.

Enclosed herewith is a Power of Attorney to the undersigned. Applicant had been prosecuting his own application; but, following the advice of the Patent Examiner, has sought the assistance of a registered Patent Attorney to prosecute this valuable patent property. Please reconsider the restriction requirement since the restriction was made without the advice of counsel.

The strength and merit of this invention cries out for generic claims and such generic coverage has been presented herein. Note for example newly presented claim 35 which reads as follows:

35. Apparatus for reducing to a minimum the fluid-dynamic base drag of a bluff body moving through a fluid passing generally along said bluff body and creating, at the rear of the body, separated shear surfaces which define a low pressure wake having an outer wake perimeter, which bluff body has a substantially flat rear base surface with given height and width dimensions and a periphery of trailing edges, said apparatus comprising:

vortex generator means mounted adjacent to and forward of said trailing edges for generating counter-rotating stream-wise vortices in said fluid layer, which generators cause the separated shear surfaces to turned sharply inward thereby reducing the size of the low pressure wake, and

edge means coupled to said base surface and inset from said trailing edges for intercepting said separated shear surfaces at the outer perimeter of said low pressure wake, namely, at a distance behind said base surface of about 1/6th to 1/8th of said given height or width dimension, whichever is less.

This generic claim covers all of the novel Basford embodiments and is clearly patentable over Bilanin, Wheeler, and Switlik. (And all other known art, as well. Please see the enclosed Basford Declaration.) Had such a claim been present with the original non-provisional filing, the restriction requirement would not have been needed, and the prosecution could have moved forward more easily without extensive drawing changes.

Nevertheless, Applicant has enclosed, for the Examiner's review an enlarged Fig. 8 with contemplated shading; and it is respectfully requested that the Examiner reconsider the earlier restriction requirement. Please rest assured, that upon allowance, a competent Patent Draftsman is available and satisfactory drawings will be submitted. In the meantime, to be fully responsive the changes shown in red to enclosed Fig. 8 are submitted along with this reconsideration request. (Applicant's Attorney has just been given Power of Attorney and did not have time to enlist the assistance of his regular Patent Draftsman.)

The Examiner kindly suggested certain headings in the specification, which headings have now been added by this amendment. Also, certain vague terminology in the claims has been corrected by suitable amendment. Proper antecedents - noted by the Examiner as lacking for certain elements in claim 5, 6 and 9 - have been provided in the newly submitted claims. As now presented, all of the claims at issue are in correspondence with the disclosure and drawing for this novel invention.

Additionally, the specification has been amended to further define the written material so that it is in full and complete correspondence with the Figures together with the preferred format for specification headings. In particular, the specification has been amended in order to correct typographical errors, omissions and some clarifying material has been added. No forbidden new matter is involved.

Applicant thanks the Examiner for his careful attention to several details in the Official Action. In particular, some suggested terms have been clarified. Also, please note that the newly presented claims follow the former claim language, but have clarified issues raised by terms such as "bluff body", "base surface", "fluid-dynamic base drag", "trailing edges" and the like. The newly presented claims also include proper antecedents, and define patentable subject matter over the known art.

The Examiner noted, in his paragraph 8, that "a truck body not a bluff body" was shown in elected Figure 8. It is respectfully submitted, that it is well known in this art that a truck body is simply one example from among many of the more encompassing generic term "bluff body". The Examiner found fault with Applicant's designation of a base surface and noted that a "truck body has six (sides) flat base surfaces not one". As herein described and depicted, the commonly accepted art term "base surface for a bluff body" is the rear flat surface of the truck body, which body normally houses divided doors as shown by number 25 in Figure 1, and repeated in detail in Applicant's other Figures.

Indeed, that prior art Figure 1, as described, sets out several of the terms used in the specification and in the claims. At page 3 of the specification, Applicant stated in reference to that Figure as follows:

Fig. 1 in the drawings is provided to help illustrate how this jet pump mechanism operates to produce base drag. Fig. 1 is a schematic plan view of the rear end of a bluff body 20, with an arrow showing the direction of fluid flow 21, the boundary layers 23 which form along the side surfaces 22, and become the separated shear surfaces 26 after passing the trailing edges 24, and the simplified flow pattern 27 in the large recirculation bubble which forms in the low pressure wake behind the base surface 25.

The base surface is, thus, clearly the rearmost flat surface 25 of the truck body – or, bluff body, if one prefers. Mr. Basford has discovered that vortex generators causes the separated shear surfaces (elements 26, above) to sharply swing inward just aft of the trailing edges 24 of the bluff body. Basford thus combines vortex arrays with boattail plates having rear edges placed so as to intercept those separated shear surfaces at the outer perimeter of the low pressure wake which is much closer to the trailer body than Bilanin or the other art suggests.

The concurrently submitted Declaration by inventor Basford provides full support for the merit of his invention and more adequately distinguishes it from the cited art. Included in that Declaration at paragraph 10 is the dramatic commercial and environmental and cost-saving resulting from application of this invention. As there noted, the Basford invention - if implemented and adopted Nationwide - would cause enormous savings to the long haul trucking industry. At current Diesel fuel prices of \$2 per gallon, as of mid March 2003, the potential fuel cost savings is over \$2 Billion per year for the trucking industry alone. Please consider the major savings when the invention is applied to other vehicle types and the associated reduction in repair costs and improved environmental aspects attendant such application.

Combining vortex generators and boattail plates, as presently claimed, it is respectfully submitted, is novel over the art. Similarly, each of the rewritten claims has focused on the Examiner's helpful suggestions, and has used unambiguous language to define this novel invention in clear and succinct terms. For example, with a truck body moving in air, maximum base drag reduction is achieved when the rear edges of the shortened boattail plates are positioned

about 1/6th the width of the truck's rear surface. Several of the claims now set forth that novel dimensional relationship in varying terminology.

The art cited by the Examiner and relied upon in the first Action relative to former claims 5 through 10, and 13 is Switlik '059 in combination with Wheeler '837. What is lacking in such art is the precise combination of linear arrays of vortex generators in combination with boattail plates, as claimed. Moreover the critical extension length of about 1/6 the width of the base surface (assuming width less than height, as usually is the case) is not suggested by such an art combination. Vortex generators, as claimed, cause the separated shear surfaces to sharply swing inwardly just aft of the trailing edges of the bluff body. Inventor Basford defines the size of his shortened boattail plates so that the rear edges of such plates intercept the separated shear surfaces at the outer perimeter of the low pressure wake. This novel, and heretofore unknown combination, provides maximum fluid-dynamic base drag reduction for a bluff body.

It is readily apparent simply from the drawings, that Switlik discloses full length boattail plates as first taught by the Bilanin '808 patent. Please note that Figures 1 and 2 of the Switlik patent show a dimension for the plates 28, 32 of about 36 inches or so. See paragraph 14 of the Basford Declaration. Also it should be noted that Switlik, at column 9, lines 31 through 47, discloses the Bilanin panels, but points his invention in the direction of ease of deployment of such panels. Please see, column 10, lines 34 through 54, etc. Nowhere does Switlik teach or suggest using shortened boattail plates of an extension length of about 12 to 18 inches or 1/8th to 1/6 the width of the base surface, as claimed.

In short summary, what has not been recognized before this novel invention, was that combining the two techniques - vortex generators and shortened boattail plates - would greatly improve base drag reduction provided that the extension length (ie. plate width, per se) of the boattail plates was about 1/6 of the width of the base surface.

Using the truck examples of the specification, the outside width of the rear base surface is about 102 inches, and the inventive 1/6 of 102 inches is about 18 inches. (It is 1/8th, or about 12 inches in Basford Fig. 9, in order to comply with the DOT Regulations for trailers built after January, 1998). This Basford

improvement is a far cry from the 36 to 40 inches of the prior art, including Bilanin, Switlik and the other references. It is clearly novel over such art.

Note that this critical "1/6th the base width feature" (or "1/8th" in Basford Fig. 9) is clearly specified in some of the rewritten claims now submitted. The Basford Declaration further sets forth ample reason why the prior art teaches away from this claimed distinction. In particular, the Basford Declaration confirms that independent Claims 19, 20, 26 and 35, for example, define a novel combination over all of the known and cited art.

Please note that the Switlik reference is completely devoid of the Basford vortex generators for creating a smaller low pressure wake, which enable the separated shear surfaces to intercept the rear edges of the shortened boattail plates at a distance of only about 1/6 to 1/8 of the base surface width.

The Basford Declaration clearly explains these novel principles in carefully worded terminology defining a new and non-obvious solution to a problem, that all prior artisans overlooked. If it were obvious, why is it not shown in all of the cited art? Indeed, the cited art – Applicant respectfully submits – testifies to the worthiness, merit and novelty of the Basford invention. It clearly does not negate this novelty. For these reasons, Applicant respectfully submits that the rejection should be withdrawn.

A very thorough and comprehensive Office Action has been responded to with all necessary corrections made to the pending claims and disclosure format. In view of the foregoing, Applicant hereby requests that all of the claims presently at issue be allowed. This case is believed to be in condition for passage to the Issuance Branch and such action is requested.

Respectfully submitted,

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